

1.9 WATER QUALITY MONITORING: STATEWIDE & WATERSHEDWIDE



INTRODUCTION



This chapter conveys the local, state, and federal agency, and organization commitment to monitoring the quality of the state's waters. The following are the primary approaches the TDA-NPS Program and its partners will use to accomplish this:

1. Continue to satisfy sections 106, 319(h), 303(d) and 305(b) of the Clean Water Act (CWA) and Tennessee Water Quality Control Act by assessing the quality of the waters of the state and determining water bodies that are and are not fully supporting their designated uses.
2. Continue to monitor water quality to determine trends.
3. Continue to support instream education efforts across the state.
4. Continue to investigate and refine new methodology for cost effective monitoring.
5. Continue to monitor the waters of the state to determine BMP effectiveness.

DESCRIPTION

Recently, water quality monitoring in Tennessee has undergone tremendous changes, especially the efforts of the Tennessee Department of Environment and Conservation, Division of Water Pollution Control (TDEC-WPC) and The Department of Health, Aquatic Biology Section. TDEC's routine statewide water quality assessment monitoring has adopted a five-year cycle watershed-based intensive sampling schedule. The methodology of benthic sampling has changed also. With the help of an EPA grant, the Biorecon method was developed to enable a quick screening of a large number of sites. Additionally, fluvial geomorphology techniques have been added to acquire additional information on the dynamics of sedimentation and erosion of impacted streams. Also, standards for water quality are currently being modified to express ecoregion differences across the state. There are now several groups in Tennessee that are sampling waters of the state in various degrees; ranging from monthly sampling to site specific benthic surveys.

EXTENT OF PROBLEM AND SOLUTIONS

There are three challenges facing the water quality monitoring programs for the state of Tennessee:

1. A need for more information
2. Increase coordination among water quality monitoring agencies and the public
3. More focused data collection, sharing and utilization

Encouraging the public to become good stewards of their environment is good for protecting water quality and is one of the fundamental methods of solving our nonpoint

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source problems. An informed public is essential. One method of accomplishing this is involving them in water quality monitoring.

The TDA-NPS program has allocated funds toward water quality assessment across the state. The more resources the state can direct towards monitoring, the better we can determine the quality of our waters and also the better we can assess progress restoring impaired waters. Better agency coordination between those monitoring water quality is an important goal. Also, a better mechanism of data sharing is key to the success of these efforts. Sharing, storing, retrieving and accessing data are critical and should become standardized among organizations.

COOPERATING PARTNERS

<u>Partners</u>	<u>Abbreviation</u>
Citizens Groups	
Tennessee Department of Environment and Conservation-Division of Water Pollution Control	TDEC-WPC
Tennessee Department of Health, Aquatic Biology Section	TDH
Tennessee Valley Authority	TVA
Tennessee Wildlife Resources Agency	TWRA
U.S. Army Corps of Engineers	USACOE
U.S. Fish and Wildlife Service	USF&WS
U.S. Geological Survey	USGS
USDI - National Park Service	USDI-NPS
Big South Fork of The Cumberland River	BSF
Great Smoky Mountains National Park	GSMNP

Citizens/ Multi-Agency Groups

There are several groups across Tennessee that conduct monitoring:

- **Boone Watershed Partnership** has quarterly lake cleanups, local high schools doing volunteer monitoring and an Adopt-A-Watershed effort with assistance from TVA and East Tennessee State University.
- **Hiwassee Interagency Team (HIT)** is a multi-agency, tri-state effort that has completed several water quality assessments and monitoring studies.
- **Sequatchie River Interagency Team (SRIT)** is a multi-agency effort that conducted a fish sampling Index of Biotic Integrity (IBI) in 1999 in the Sequatchie watershed to determine the health of the waters compared to an IBI done in 1970.
- **Mid-South Fly Fishers** have funded the water quality monitoring in at least three schools in West Tennessee.

Several schools in Tennessee have integrated water quality monitoring into their activities. For example, 12 schools (middle and high schools) in east Tennessee have put in place an Adopt-A-Watershed curriculum with the assistance of the Knoxville Water Quality Forum. Eight more schools are planned for the future.

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Tennessee Department of Environment and Conservation – Water Pollution Control (TDEC-WPC)

The function of the Division of Water Pollution Control's water quality monitoring program is to provide a measure of Tennessee's progress towards meeting the goals established in the federal Clean Water Act and the Tennessee Water Quality Control Act.

To accomplish this task, data are collected and interpreted in order to:

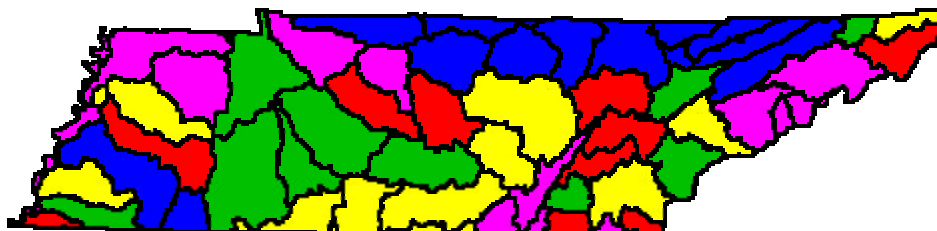
1. Identify problem areas where instream pollutants violate Tennessee numerical or narrative Water Quality Standards, thereby assessing the degree of impairment of designated uses.
2. Document areas with potential human health threats from fish tissue contamination or elevated bacteria levels.
3. Establish trends in water quality.
4. Gauge compliance with NPDES permit limits.
5. Document baseline conditions at reference sites.
6. Measure water quality improvements based on site remediation.
7. Identify proper stream-use classification, including Anti-degradation Statement implementation.
8. Document water quality changes in the eleven Unified Watershed Assessment (UWA) watersheds.

It is the responsibility of the TDEC-WPC to secure, protect, and preserve the right of Tennessee's citizens to unpolluted waters. TDEC-WPC has begun to synchronize the issuance of discharge permits on a watershed basis. The monitoring schedule now coincides with the watershed cycle. In addition to synchronizing permits, the Division will use the Watershed Management Approach to improve coordination with other organizations involved with protecting water resources, and to encourage public participation.

The state has 54 watersheds corresponding to the 8-digit USGS Hydrologic Unit Code (HUC). These watersheds are combined in five groups for monitoring, on a rotating five year cycle, according to year of implementation.

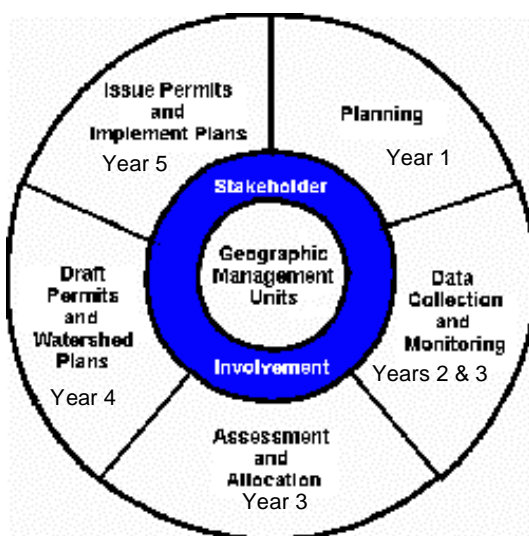
The watershed management approach was initiated in the first group of watersheds in 1996. Additional groups will be initiated in each subsequent year.

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	West Tennessee	Middle Tennessee	East Tennessee
Group 1	<ul style="list-style-type: none"> • Nonconnah • South Fork of the Forked Deer 	<ul style="list-style-type: none"> • Stones • Harpeth 	<ul style="list-style-type: none"> • Tennessee (in Meigs & Rhea Counties) • Watts Bar • Ocoee • Emory • Watauga
Group 2	<ul style="list-style-type: none"> • Loosahatchie • North Fork Forked Deer • Forked Deer 	<ul style="list-style-type: none"> • Collins • Caney Fork • Wheeler Lake • Upper Elk • Lower Elk • Pickwick Lake 	<ul style="list-style-type: none"> • Hiwassee • Fort Loudoun / Little • South Fork Holston
Group 3	<ul style="list-style-type: none"> • Wolf • Tennessee Western Valley (Beech) • Tennessee Western Valley (KY Lake) 	<ul style="list-style-type: none"> • Upper Duck • Lower Duck • Buffalo 	<ul style="list-style-type: none"> • Tennessee (Hamilton Co. w/o Chattanooga) • Little Tennessee • Lower Clinch • North Fork Holston
Group 4	<ul style="list-style-type: none"> • Lower Hatchie • Upper Hatchie 	<ul style="list-style-type: none"> • Red • Barren • Cumberland (Old Hickory Lake) • Upper Cumberland (Cumberland Lake) • Upper Cumberland (Cordell Hull) • Obey 	<ul style="list-style-type: none"> • South Fork Cumberland • Upper Cumberland • Powell • Upper Clinch • Holston • Tennessee (Chattanooga Area)
Group 5	<ul style="list-style-type: none"> • Mississippi • North Fork Obion • South Fork Obion 	<ul style="list-style-type: none"> • Lower Cumberland (Lake Barkley) • Lower Cumberland • Gunter'sville Lake 	<ul style="list-style-type: none"> • Tennessee (Marion County) • Sequatchie • Conasauga • Upper French • Lower French • Pigeon • Nolichucky

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The watershed management approach uses a 5-year cycle. Tennessee's cycle begins with planning and data collection in the first year. Monitoring, assessment, wasteload allocation, and permit issuance occur in the following years.

Although three public meetings are scheduled in years one, three and five of the five year cycle, public participation is scheduled and encouraged throughout the cycle.

Each year the planning phase for one of the five groups begins. Division's activities in each group will be sequenced into a 5-year cycle that coincides with the duration of discharge permits. Monitoring will take place in the second year, and occasionally in the third year, of each cycle.

In January 1999, TDEC initiated a 4-year Strategic Plan. The strategy states that the Department will protect, preserve and improve the quality of Tennessee's air, land and water.

The following action items are listed in the plan:

- Complete the assessment and prioritization of 32 watersheds under the Department's water quality management plan by January 1, 2003.
- Reduce by 25 percent the number of impaired stream miles listed on the 1998 303(d) list by January 1, 2003.
- By January 1, 2003, develop control strategies, in conjunction with state and federal partners, on 100 streams that are listed on the 303(d) list of stream that are not achieving compliance with at least one use classification.
- Achieve no net loss of wetlands over the next four years.
- Monitor water quality of rivers, lakes, wetlands, and ground water and report annually on improvements in water quality conditions throughout the state.

Tennessee Department of Health (TDH)

Current Projects

1. **Probabilistic monitoring** of 50 sites randomly selected in ecological subregion 71i (Inner Nashville Basin). Jan 2000 - December 2000. Benthic organisms collected (semi-quantitative) spring and fall, chemicals collected quarterly.
2. **TMDL on Davis Creek**, Claiborne County. Nine stations. Benthic organisms collected once, in fall. (Biorecon). Chemicals collected monthly. Jan 2000 - Dec 2001.
3. Assisting TDEC-WPC in Group III watershed chemical collections. Bacteria at 32 stations monthly. Chemical collections at 18 stations, quarterly. Dec 99 - November 2000.
4. **Biorecons and chemical collections** at 20 stations in Hardin Co. - June 2000.
5. **Biorecons** at 10 sites in the Big Sandy Watershed - October 2000.

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6. **Biorecons** 13 for Memphis Environmental Assistance Center - June 2000.
7. **Nolichucky Watershed Survey-UWA project** (Biorecons all tribs, semi-quantitative and chemicals at 303(d) listed sites) July-October 2000.
8. **Little River Watershed** (Biorecons all tribs, semi-quantitative and chemicals at 303(d) listed sites) Oct-Nov 2000.

Tennessee Valley Authority (TVA)

TVA has an extensive history in sampling streams and reservoirs in the Tennessee River watersheds. Their methodology is as follows:

Reservoir sampling for ecological health in 31 reservoirs: 1 – 4 site per reservoir every other year	Nutrients, DO, pH, etc. - monthly *Benthic: annually, Fish community: annually Sediment quality: annually Fish tissue: every 2 – 4 years
Public Recreation Areas - Bacteria Sampling	200+ sites on reservoirs and streams
Stream Sampling: Fixed Stations on 18 major tributaries of the Tennessee River	Fish IBI: annually Benthic: annually Fish community: annually Nutrients, D.O., pH, etc. - quarterly
Ambient Sampling: 900 sites are sampled on rotational system (150 – 180 per year)	Fish IBI & Benthic assessment annually on a five year cycle

*Benthic – macroinvertebrates

Tennessee Wildlife Resources Agency (TWRA)

TWRA samples approximately 75 sites annually. At the sites they sample for fish IBI, pH, temperature, conductivity, dissolved oxygen, and rapid habitat assessment. Watershed evaluation, fish community, and benthic assessments are performed on approximately one third of the sites.

US ARMY CORPS OF ENGINEERS (USCOE), NASHVILLE DISTRICT General Sampling Plan for Years 2000-2004

Lake Barkley

Total of **nine** sites in Tennessee. (7 Lake sites, 2 Stream sites)

Sampling trips per year = 2

In Year 2002 they will collect samples for contaminants at 3 sites. See below for details.

Cheatham

Total of **16** sites. (11 Lake sites, 5 Stream sites)

Sampling trips per year = 2

In Year 2004 they will collect samples for contaminants at 10 sites. See below for details.

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Old Hickory

Total of **15** sites. (9 Lake sites, 6 Stream sites)

Sampling trips per year = 2, **except in 2001 when 5 trips will be made (Intensive Level).**

In Year 2001 they will collect samples for contaminants at 5 sites. See below for details.

Cordell Hull

Total of **16** sites. (11 Lake sites, 5 Stream sites)

Sampling trips per year = 2.

In Year 2000 they will collect samples for contaminants at 5 sites. See below for details.

J. Percy Priest

Total of **17** sites. (11 Lake sites, 6 Stream sites)

Sampling trips per year = 2, **except in 2004 when 5 trips will be made (Intensive Level).**

In Year 2004 they will collect contaminants at 8 sites. See below for details.

Center Hill

Total of **19** sites. (11 Lake sites, 8 Stream sites)

Sampling trips per year = 2.

In Year 2001 they will collect contaminants at 5 sites. See below for details.

Dale Hollow

Total of **16** sites. (9 Lake sites, 7 Stream sites)

Sampling trips per year = 2, **except in 2000 when 5 trips will be made (Intensive Level).**

In Year 2000 they will collect contaminants at 6 sites. See below for details.

Parameters

- In Situ: Temperature, Dissolved Oxygen, pH, Specific Conductance, Secchi Disk Transparency, Alkalinity
- Metals: Aluminum, Calcium, Iron, Magnesium, Manganese, Potassium, Sodium, Zinc
- Nutrients: Nitrate/Nitrite, Ammonia Nitrogen, Kjeldahl Nitrogen, Phosphorus Total & Dissolved
- Total Organic Carbon, Hardness, Sulfates, and Chlorophyll a
- Solids: Total Solids, Suspended Solids, Dissolved Solids, Total Volatile Solids, Suspended Volatile Solids, Dissolved Volatile Solids
- Algae: Phytoplankton Species identifications, densities, trophic state, diversity
- Benthic Macroinvertebrates: Species identifications, densities, and various other metrics/indices are calculated
- Sediment Contaminants: Priority Pollutant Metals, Pesticides, PCB's, Volatile Organics, Semi-volatile organics

Sampling Frequency:

- Routine: Two per project per year
- Intensive: Five trips per project per year

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US Fish and Wildlife Service (USF&WS)

The USF&WS samples seven wildlife refuges in Tennessee, at a frequency of two to five sites per refuge every two years. The parameters are:

- fish
- macroinvertebrates
- water quality
- sediment

USF&WS is the principal Federal agency responsible for conserving, protecting, and enhancing fish, wildlife, and plants and their habitats for the continuing benefit of the American people. These goals are accomplished through Federal programs relating to migratory birds, threatened and endangered species, certain marine mammals, inland sport fisheries, specific fishery and wildlife research activities, and management of the National Wildlife Refuge System and National Fish Hatchery System.

Programs implemented by the Tennessee/Kentucky Field Office are concentrated in the areas of endangered species recovery, habitat restoration on public and private lands, contaminant assessments, rare species surveys and monitoring, wetland and other habitat characterizations, and evaluations of the effects of proposed water and land development projects, including surface and underground mining, on fish and wildlife resources and habitats.

Contaminant investigations, which have been conducted in the Tennessee River, Cumberland River, and Mississippi River watersheds, include:

Tennessee River Watershed		
Tennessee NWR	Tennessee and Big Sandy Rivers	Houston Co., TN
	Tennessee River	Hardin Co., TN
Cumberland River Watershed		
Cross Creeks NWR	Cumberland River	Stewart Co., TN
Bear Creek (BSF)	Bear Creek	Scott Co., TN
Mississippi River BEST	Cumberland River	Montgomery Co., TN
Mississippi River Watershed		
Reelfoot NWR	Reelfoot Lake/Lake Isom	Obion Co., TN
	Mississippi River	Shelby Co., TN
Chickasaw NWR	Mississippi River	Lauderdale Co., TN
Mississippi River Alluvial Plain	Mississippi River	West Tennessee
Lower Hatchie NWR	Hatchie River	Tipton Co., TN
Hatchie NWR	Hatchie River	Haywood Co., TN

Statutory authority for Service-related assessment activities is primarily provided through the Fish and Wildlife Coordination Act (48 Stat. 401, as amended; 16 U.S.C. 661 et seq.) and the Endangered Species Act (87 Stat. 884, as amended; 16 U.S.C. 1531 et seq.). Funding mechanisms operate on a one-year cycle from October 1 to September 30. Funding for a wide variety of monitoring and enhancement activities is also provided to the TWRA through Section 6 of the Endangered Species Act.

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USDI – National Park Service

Big South Fork National River and Recreation Area (BISO)

Personnel in the park service monitor water quality at five sites in the BISO and at five sites in the Obed Wild and Scenic River four times a year. In the past, they were monitoring 30 sites at each park. They monitor the following parameters: Dissolved Oxygen, temperature, pH, alkalinity, acidity, chloride, iron, sulfate, manganese, fecal streptococci and coliform. They are in the process of re-evaluating the parameters and sites.

Great Smoky Mountains National Park (GSMNP)

Personnel in the park service sample 90 sites quarterly for fish IBIs, pH, conductivity, chloride, nitrate, sulfate, sodium, ammonium, potassium, magnesium, calcium, silica, and total aluminum (for selected sites). The University of Tennessee is currently analyzing the data and will make recommendations for any future changes in the sites and frequency of sampling.

US Geological Survey (USGS)

USGS maintains stream gages across Tennessee. Additionally, they perform water quality sampling to support special projects.

Sampling Type	Sites
Stream Flow discharge	61 stream sites
Stage lake sampling	32 sites
Water well sampling	21 wells sites
Regular basic sampling	8 stream sites
Irregular sampling	30 sites one or two times a year
Monthly stream sampling	5 sites

USGS also conducts special study units called the National Water Quality Assessment Program, NAWQA. In Tennessee, there are three being conducted: The Lower Tennessee River Basin Study, the Upper Tennessee River Basin Study Unit, and the Mississippi Embayment. Study planning and design, and analysis of existing data, will be done during the first 2 years. After the 2-year planning period, surface and groundwater and ecological data will be collected intensively for 3 years during a high-intensity phase. A lower intensity phase follows for the next 6 years during which water quality is monitored at a selected number of sites and areas assessed during the high-intensity phase. Alternating high- and low-intensity monitoring phases allows the NAWQA Program to examine trends in water quality over time in a cost-effective manner, eventually assessing about two-thirds of the Nation's water resources. During the high-intensity phase, new chemical, physical, and ecological data will be collected from selected areas at local and regional scales to describe the quality of water throughout the study unit. These data will be used to determine the water chemistry of streams and aquifers; the quantity and quality of suspended sediment and bottom sediments in streams; the variety and number of fish, benthic invertebrates, and algae in streams; and the presence of contaminants in fish tissues. Individual streams, aquifers, and biological species representative of the most important water resources and water-quality concerns in the study unit and the Nation are selected for sampling and analysis.

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A series of technical and nontechnical reports describing the results of high- and low-intensity-phase data collection and analysis are planned.

OTHER FUNDING SOURCES

Additional funding sources for environmental projects are listed in the Catalog of Federal Funding, which can be found at: www.aspe.os.dhhs.gov/cfda

CURRENT 319 PROJECTS

TDA-NPS has funded monitoring in specific watersheds and projects since its inception. In FY-97, we began funding TDEC's Watershed Based Monitoring program across the state and in FY-99 we began a focused effort of documenting water quality change in the 11 UWA watersheds.

Instream Education

The TDA-NPS program is developing an Instream Education Manual to aid local groups in setting up water quality sampling/education programs. The manual will give specific information on how to conduct an instream education program.

TDEC WPC

Statewide Watershed Monitoring

In 1996, TDEC began a watershed initiative for water quality management. This watershed approach consists of five parts:

- 1) Planning and data collection
- 2) Monitoring
- 3) Assessment and allocation
- 4) Drafting watershed plans and
- 5) Implementation of watershed plans.

The watershed effort at the TDEC-WPC has been receiving TDA-NPS funding for water quality monitoring. In the future, we will continue to fund this activity.

The goals of this project are to improve water quality monitoring by applying a comprehensive approach to runoff pollution source identification and pollutant load analysis. This analysis of water quality, and the identification of areas impacted by nps pollution, will result in a more comprehensive water quality assessment and a more informed strategy for establishing future BMPs. Three strategies will be set to facilitate meeting this goal:

1. General qualitative assessment at the watershed level (BioRecon) will identify areas for further attention and assess the overall health of the watershed.
2. Conduct intensive chemical and biological (single habitat approach, formerly known as RBP3) monitoring at the subwatershed level to identify or quantify pollution sources or causes. Specific monitoring [single habitat approach (RBP3) and chemical analyses] at sites identified in BioRecon will provide more detailed information about the causes and sources of nps impacts and

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3. Fluvial geomorphology (FGM) techniques will provide information about erosion and sediment of reference and impacted streams.

All selected sites will be mapped on GIS. Data, strategies, and watershed plans will be shared with cooperating organizations.

Following the schedule of Tennessee's watershed initiative, several approaches will be used to monitor water quality of impaired waters including:

- monitoring water quality before and after BMP implementation,
- monitoring water quality of streams in the vicinity of CAFO sites,
- focused monitoring in the second year of a two year monitoring strategy (a follow-up to first year monitoring designed to further characterize impacted water),
- special studies (monitoring at TDA-NPS-recommended sites),
- field correlation of macroinvertebrate populations and causes of impairment,
- collection of flow data for pollutant load calculation and verification,
- monitoring the physical stability of streams (determining bankfull discharges and cross-sectional areas and establishing regional curves),
- comparison of TDEC and NRCS habitat assessments, and
- monitoring baseline/reference stream conditions.

AUSTIN PEAY STATE UNIVERSITY (APSU)

Within the Red River/Sulphur Fork Creek 319(h) project, APSU, Center For Field Biology, is performing monitoring:

Two monitoring sites for each of the project's three subwatersheds are being sampled.

AREAS FOR PROGRAM EXPANSION

- Expand monitoring to determine if 303(d) listed waters have reached designated uses due to the efforts of 319(h) projects or partners.
- Continue to investigate more cost effective methods of water quality monitoring.
- Increase the number of partners to expand the amount of water quality monitoring done annually in Tennessee.
- All monitoring data collected in the state should be placed in STORET and/or made accessible on the Internet.

MEASURES OF SUCCESS

- Increase the number of stream miles reaching their designated uses and taken off the 303(d) list.
- Increase in the number of assessed stream miles.
- Increase in the amount of data entered in STORET by partners.

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MILESTONES

Long Term Goal 1.

Hold regularly scheduled meetings with stakeholders, to create new partnerships, to strengthen existing partnerships, and to foster greater trust, commitment and accountability.

- **Action 1:** The Water Quality Working Group (WQWG) will meet semi-annually.
Lead: TDA-NPS Program
Key partners: TDEC-WPC; TDH; TVA; TWRA; USCOE; USF&WS; USGS; USDI-NPS; BISO; GSMNP
Year(s): 2001-2005
- **Action 2:** Increase WQWG membership by one member each year.
Lead: TDA-NPS Program
Key partners: TDEC-WPC; TDH; TVA; TWRA; USCOE; USF&WS; USGS; USDI-NPS; BISO; GSMNP
Year(s): 2001-2005
- **Action 3:** Establish the WQWG mission statement, a list of collective capabilities, and priorities for funding.
Lead Agencies: WQWG and TDA-NPS Program
Key partners: TDEC-WPC; TDH; TVA; TWRA; USCOE; USF&WS; USGS; USDI-NPS; BISO; GSMNP
Year(s): 2001-2005
- **Action 4:** Develop Memoranda of Agreement with key federal agencies to improve programmatic consistency.
Lead: TDA-NPS Program
Key Partners: All federal agency partners
Year(s): 2001-2005

Long Term Goal 2.

Fully implement all developed TMDLs for nonpoint sources in compliance with existing regulations, policies, or agreements by 2015.

- **Action 1:** Coordinate water quality remediation efforts between TDEC-WPC and TDA-NPS Program with the development of Water Quality-related TMDLs, researching a unified approach in setting TMDL standards.
Lead: TDEC-WPC & TDA-NPS Program
Key partners: TDH; TVA; TWRA; USCOE; USF&WS; USGS; USDI-NPS; BISO; GSMNP
Year(s): 2001

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- **Action 2:** Provide information concerning TMDL development to the WQWG, to gain their participation.
Leads: TDA-NPS Program, TDEC-WPC
Key Partners: WQWG
Year(s): 2001-2005
- **Action 3:** Provide necessary input to TDEC-WPC concerning nonpoint issues on 100% of waters selected for TMDL development.
Leads: TDA-NPS Program, TDEC-WPC
Key Partners: WQWG
Year(s): 2001-2005
- **Action 4:** Create an implementation plan for any TMDL developed by TDEC-WPC involving pollutants originating from Water Quality nonpoint sources.
Leads: TDA-NPS Program, TDEC-WPC
Key Partners: WQWG
Year(s): 2001-2005

Long Term Goal 3.

Restore all waters impaired by nonpoint sources that are listed on the 1998 303(d) List to the condition of fully supporting their designated uses by 2015, in cooperation with local, state and federal partners.

Action items for Water Quality Monitoring are listed under Long Term Goal 7.

Long Term Goal 4.

Beginning in 2006, through regulatory and non-regulatory means, prevent previously unlisted waters from being included on the 303(d) List because of nonpoint source impairments.

Action items for Water Quality Monitoring are listed under Long Term Goal 7.

Long Term Goal 5.

Improve the knowledge of stakeholders and citizens concerning the origins, magnitude, and prevention of nonpoint source pollution, and how to prevent it.

- **Action 1:** Develop and distribute educational material concerning Water Quality issues in increasing amounts each year.
Lead: TDA-NPS Program
Key partners:
Year(s): 2001-2005
- **Action 2:** Through 319 demonstration projects across the state, encourage local entities to create projects to remediate improper Water Quality sites which are affecting local water quality.
Lead: TDA-NPS Program
Key partners:

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Year(s): 2001-2005

- **Action 3:** Provide educational information concerning Water Quality on the TDA-NPS web page.

Lead: TDA-NPS

Year(s): 2001

Long Term Goal 6.

Through the process of continuous improvement, routinely assess all programmatic functions of the TDA-NPS Program in order to maximize efficiency, decrease the bureaucratic burden and increase the numbers of participants in the program.

- **Action 1:** Investigate other funding sources such as The Nature Conservancy, Brownfields Program, as well as EPA.
Lead: TDA-NPS Program
Key partners: The Nature Conservancy; US EPA
Year(s): 2001-2005
- **Action 2:** Provide responses to all project related inquiries from grantees within three business days of the request.
Lead: TDA-NPS Program
Year(s): 2001-2005
- **Action 3:** Work with grantees to achieve timely submittal of all progress reports 100% of the time.
Lead: TDA-NPS Program
Year(s): 2001-2005
- **Action 4:** Develop a Priority Ranking System for project review.
Lead: TDA-NPS Program
Year(s): 2001-2005
- **Action 5:** Request feedback from partners annually to assess the quality of the TDA-NPS Program
Lead: TDA-NPS Program
Year(s): 2001-2005

Long Term Goal 7

Use the maximum allowable percentage of funding annually to assist partners with water quality monitoring and assessment, for the duration of the 319 program.

- **Action 1:** Continue the five-year watershed management approach for collecting water quality data.
Lead: TDEC-WPC
Year(s): 2001-2005

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- **Action 2:** Annually, develop at least nine watershed/water quality management plans.
Lead: TDEC-WPC
Key partners: TDH; TVA; TWRA; USCOE; USF&WS; USGS; USDI-NPS; BISO; GSMNP; TDA-NPS Program
Year(s): 2001-2005